A review-based study to assess dental students' knowledge of ionising radiation.

Singh Neha[1], Ashita Jain[2], Deswal Mohit[2], Khan Alam Arshad [2], Boora Navreet[2], Ranjan Rohit[1]

Corresponding Author Detail- Mrs. Neha Singh

INTRODUCTION

Radiation is the form of energy, which can travel in space and matter. Radiation can be categorized into two according to their property of ionization, i.e., ejection of electrons from their orbit. Two kinds of radiations are: ionizing radiation and non-ionizing radiation. [1] The field of dental science, make use of x-rays which is the type of ionizing radiation, for there most considerable applications, like identification of Incipient caries, minuscule fractures and precision of implant planning. [2] To comply with the Ionising Radiation Medical Exposure Regulations 2000 Law, any member of staff who conducts exams involving x-rays should be prepared. [3] It was described that ionizing radiation, is the source of changes in the DNA strands of living tissues causing biological effects. [4] Ionising radiation's impact on living things are congregate into stochastic and deterministic effect. Deterministic impact is the phenomenon in which harmful consequences begin to manifest after exposure to a fixed level of radiation. Stochastic effect is that, where the dose amount above which the body undergoes natural alterations is unspecified. [3]

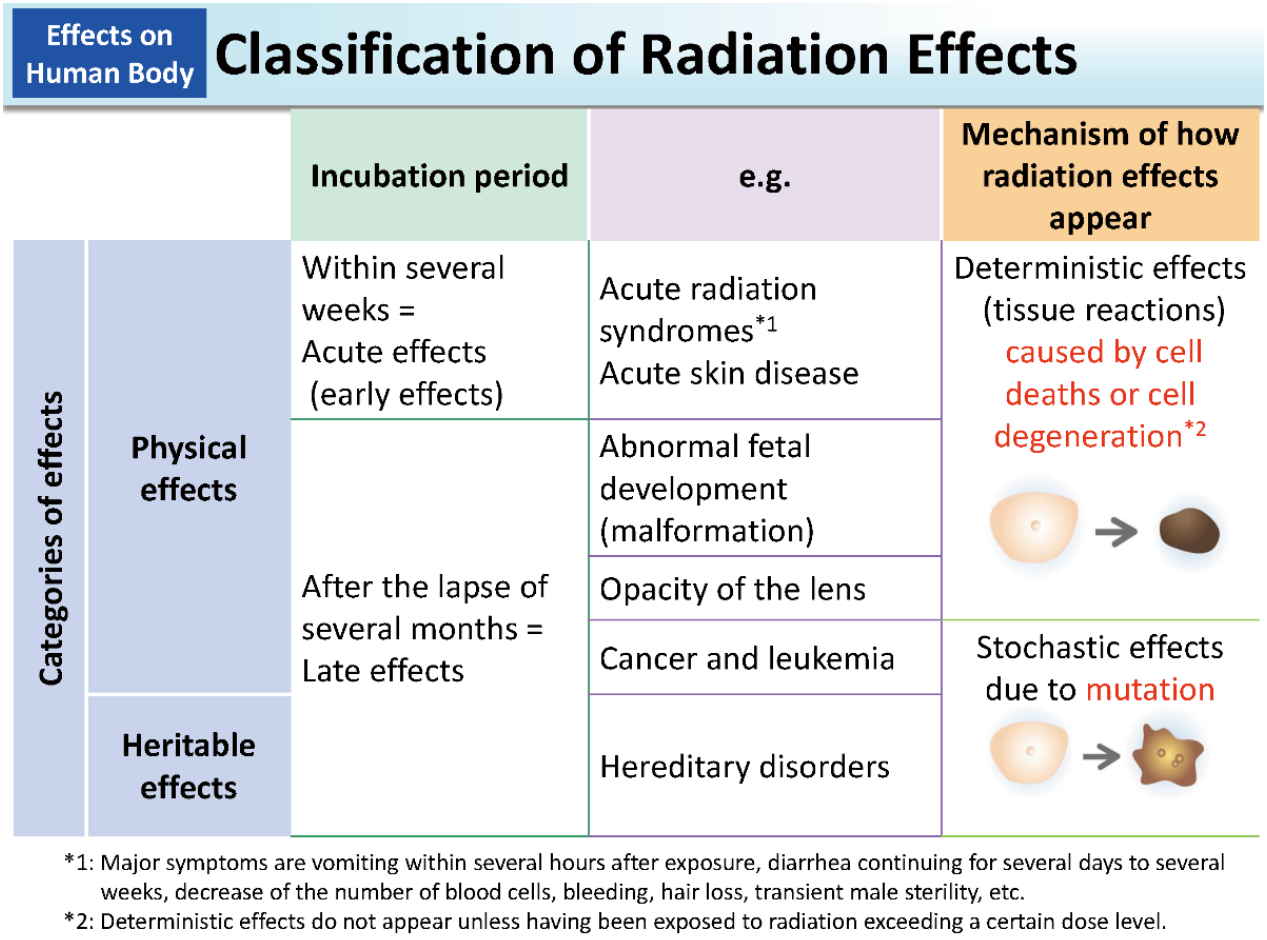

Figure 1.1: Shows effect on human body [25]

Table 1.1: Showing the impact of radiation dose

DOSE (rems)	POSSIBLE EFFECT
0-25	**No obvious effect**
25-100	**Trivial blood changes**
100-200	**Vomiting, fatigue (Recovery in week)**
200-600	**Vomiting, severe blood changes, hemorrhage (Recovery in 1-12 month)**
600-1000	**Survival unlikely**

Due to this reason, several protection recommendations have been set by different associations worldwide, clinical training are given to dental students as the part of academic syllabus for educating them the concept of radiation hazards and their reduction methods. [5] In radiation protection, ICRP gave three main principles i.e., justification principle, which is followed during examination to make sure that the dentists execute better than harm. Secondly, optimization principle, which make sure that the dentists utilize every chance to lessen the non-essential exposure to their patient and themselves. They had recommended standard values of radiation dose which are allowable, this recommendation comes under the third principle. As a fixed quantity of radiation cannot be completely avoided when delivering to patients, it should be kept as low as is practically possible, which is known as ALARA concept.[6]

The term "dosimeter" refers to the device used to calculate radiation exposure. A thermo-luminescent dosimeter and a film badge are two examples of personnel monitoring dosimeters that are used to determine the radiation dosage that a radiation worker receives. Utilizing these tools, the dosimetry service provider calculates the exposure from various radiation types and informs the employer of the results.[1]

AIM

The goal of this review-study is to search through all of the database articles that are evaluating dentistry students' understanding of ionising radiation, including radiation dangers and radiation protection.

OBJECTIVE

It is a retrospective study, which allow us to find the knowledge regarding ionizing radiation within dentistry students.

MATERIALS AND METHODS

In this research we included 24 articles published related to knowledge about the ionizing radiation & their effects on human body. For that we found various article from various platform as per need. Out of 24, 18 database articles are selected from different journals like: PubMed, Dentistry: an open access journal, IP International Journal of Maxillofacial Imaging, dentistry journal, google scholar, etc., which are published after the year of 2009 are used for conclusion and result. Several medical headers and free text were utilized, as well as exposure-related keyword phrases including "knowledge," "radiation hazard," "radiation protection," and "dental students.

DISCUSSION

Dental radiography has evolved from the first time X-rays were used in dentistry to become an essential diagnostic technique for the diagnosis of oral disease.[7] It is a crucial component of professional dentistry practise, offering clinicians and patients enormous advantages. Its functions ranged from diagnostic through treatment planning, treatment direction, prognosis prediction, and treatment outcome monitoring.[8] Despite the fact that radiation is used extensively in the medical industry, if not handled carefully, it may be deadly. The benefit of improving human health and the danger associated with radiation exposure to technicians, students, patients, and the general public must be carefully balanced. [9]

The prevalence of cancer, birth deformities, cataracts, and a shorter life expectancy have all increased over the past year, according to tests done to quantify radiation exposure. [10] In the modern world, everyone is exposed to ionising radiation. It has been suggested that there is a linear relationship between radiation exposure and the development of

cancer.[11] Ionization-induced cell death is a result of the X-ray. Ionising radiation is the focus of extensive safety legislation, which is intended to reduce the danger of radiation exposure.[12]

Dental radiography is not often associated with the same type of dangerous consequences, but it is nevertheless crucial to track and manage its random effects. [13] Medical professionals should only order radiological examinations when the advantages outweigh the risks and for specific objectives.[14] The attitude and behavior of dental students while using ionizing radiation, mainly X-rays are determined by their knowledge regarding its effect on humans. The potential risk of radiation exposure in the form of stochastic effects may not be accurately estimated by dental students. [15] Dental students should be knowledgeable about radiation protection measures in order to safeguard themselves, their patients, and those around them. Their knowledge of ionising radiation from medical equipment makes it simple to explain advantages and concerns to the patient. [14]

To raise awareness among dental professionals, it is essential that all radiology departments mandate ongoing professional development through the organization of radiation protection seminars and the distribution of posters on radiation protection and safety. [16]

ACCORDING TO QUESTIONS LEVEL

In this present study, the questionnaire is divided in difficult level and easy level. Out of eighteen articles, four articles have basic questions regarding radiation hazard symbol, NCRP/ ICRP recommendation, ALARA principle, maximum permissible dose, radiation protection devices and benefits of digital radiography over conventional radiography.

Rest fourteen articles have difficult questions regarding, collimator and filter utility in dental radiography, speed of film to reduce radiation dose, material of screen, way of holding film during exposure, AERB guidelines, radiation protection guideline, most sensitive organ in dental radiography, radio-sensitive site in cell, contraindication of exposure during pregnancy, and personnel monitoring device.

ACCORDING TO SAMPLE SIZE

Out of eighteen articles, nine articles had less than two-hundred sample size and rest nine had more than two-hundred sample size. As per my knowledge, in questionnaire- based study, with large sample size had significant result as compared to small sample size.

ACCORDING TO RESULT

In this present study, out of eighteen articles, six articles shows that the overall correct response was more than 50%. Other two articles gave the range of correct response which is between 19.3%- 69.9% and 22%- 76%.

Further four articles did not give the accurate percentage but said the knowledge regarding radiation was quite fair and other four articles said that the result varies according to their academic experience like post-graduate students have significant knowledge followed by interns and under-graduate students.

Rest two articles said, there was lack of knowledge or poor knowledge regarding radiation.

CONCLUSION

This review research demonstrates that, the overall understanding of radiation risks and radiation protection was low to high, because of variation in sample size like some study had small group for survey and some had large group, which affect the result accordingly. This shows that there is a necessity of large number of participants for significant result. Also, the knowledge of participants can be increased significantly by planning radiation safety courses and workshops.

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